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ABSTRACT

This paper focuses on an online video based correction system for language learning. The prototype system using the proposed model supports learning between a native English teacher and a non-native learner using a videoconference system. It extends the videoconference system so that it can record the conversation of a learning scene. If a teacher edits the video to include explanations, the video can become very useful as teaching material. However, in ordinal video-editing systems, it is difficult to show edited parts. Therefore, this paper proposes a video correction system and focuses on the online video-editing model. (Contains 14 references, 1 table, and 4 figures.) (Author)

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Supporting Online Video-based Correction for Language Learning through Markup-based Video Editing

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Abstract: This paper focuses on an online video based correction system for language learning. The prototype system using the proposed model supports learning between a native English teacher and a non-native learner using a videoconference system. It extends the videoconference system so that it can record the conversation of a learning scene. If a teacher edits the video to include explanations, the video can become very useful as teaching material. However, in ordinal video-editing systems, it is difficult to show edited parts. Therefore, this paper proposes a video correction system and focuses on the online video-editing model.

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Introduction

With fast development of the Internet, people around the world have more chances to communicate directly with CMC (Computer Mediated Communication) tools, such as e-mail, chat and bulletin board systems. By applying the CMC tools to language learning, it is possible for learners to communicate with native speakers in foreign languages. In fact, many approaches, which may lead to improved exchanges among different cultures and language learning with the CMC tools, have been proposed. Hanson et al. (1998) used the CMC tools for improving international collaboration and comprehension among university learners around the world. The experiment showed that a learner's ability to comprehend and express themselves in foreign languages was highly improved. It also pointed out direct communication with native speakers was very important for foreign language learning. An approach that emphasizes foreign language study through communication is known as the communicative approach (Johnson & Morrow, 1981). In this approach, grammatical rules and vocabularies are of secondary importance. Recently, the communicative approach has attracted much interest in CALL (Computer Assisted Language Learning).

From a technical point of view, the high-speed and broadband network has realized rich, smooth and synchronous communication and collaboration using not only text but also audio and video materials (LeeTiernan et al, 2001). For example, in an English conversation school in Japan, Japanese learners attempt to master English with a distant teacher (native speaker) using a videoconference system. The interactive video makes learning more effective (Dalton, 1990). What seems to be lacking, however, is reuse of the conversational video for language learning by reviewing and editing the video of the past lesson.

This paper proposes an online video-editing model for language learning, which allows the teacher and the learner to revise and edit their conversational video. If the videoconference system records their conversation into video files, the teacher can edit the videos using a video-editing tool. However, it may be very difficult for the learner to understand the teacher's task in the original video because the ordinal tools create quite a different video from the original one. Therefore, we propose a markup-based video-editing system called Vielle (Video-based Communicative Language Learning Support System) through the proposed model, which provides a similar environment to a real one where texts are corrected using red-pen on paper. Using this system, a learner can correct their conversational video, e.g., a teacher inserts a new video segment and annotations with correction marks. Using this system, it becomes easier to understand the teacher's correction comments. The features of Vielle are as follows:

(1) A teacher can correct a video recorded by the videoconference system in Vielle.

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(2) The system uses VCML (Video-based Correction Markup Language) to describe the contents of the video correction.
(3) A learner can see what the teacher has just corrected. This is based on WISIWYS (What I See Is What You See).
(4) A learner can study by interacting with this system based on the correction marks.
(5) The revised/explained video can be generated from an original video and a VCML document.

This paper is organized as following. First, related work is introduced. After that, a video correction and an online video-editing model are described. In the next section, a VCML is used to describe the video correction and the implementation system is shown. Finally, concluding remarks are given.

Related Work

Recently, wide ranges of authoring systems have been developed, which allow both text and media annotations. Among them, a multimedia annotation environment for young children using Java has been developed (Bouras, et al., 2000). It is used to provide children with the opportunity to reflect upon and annotate episodes from their everyday life. This system can lead to arguments with many learners. However, it has no functions to learn with the inserted annotations.

The approach used in the project of ACTS082 called DIANE (Benz, et al, 1997) recorded an arbitrary application output of the basic content of a multimedia document and to annotate it with all kinds of media available to the user. This system defines the annotation framework, however, the target for usage is not defined clearly. Therefore, it can cope with the ordinal video but cannot deal with two videos recorded by a videoconference system. It has no players to show these synchronously.

The classroom 2000 (Abowd, et al, 1996) project focused on teaching material. There is a hypothesis; tools to aid in the capture and subsequent access of classroom information will enhance both the learning and teaching experience. Therefore, the teacher can make teaching materials with various media and show it to the learner. The learner can annotate on the teaching material. However, the learner cannot study with his/her own video.

Lieberman et al (1994) have developed a system to use video as a tool for procedural knowledge representation. However, this system is not suited to language learning because it can only annotate still pictures extracted from the original video by drawing.

Language Learning using Video Correction

Video Correction

Conventionally, texts have been corrected using a red pen to highlight errors. Thus, rectified contents are made clear. According to such a traditional correction manner, an online markup-based collaborative writing support system, called CoCoA (Communicative Correction Assisting System) (Ogata et al, 1997) and CoCoA-J (CoCoA for Java) (Ogata et al, 2000) has been developed, which is very similar to the real correction environment with a pen and paper. This system has been used for language learning, and it can automatically generate the original text and the revised one from the corrected text. However, it cannot deal with multimedia contents such as video and audio. Therefore, it cannot correct a video like a text, exactly.

In order to rectify a video, one should focus on each of the smallest units. A text consists of many characters. The correction of a text operates on a character. Similarly, a video consists of many frames. It can operate like a text if a frame is treated like a character. [Figure 1] shows text correction and video correction. The correction of a text in (A) shows deletion and insertion for characters. Video correction in (B) shows them for frames.

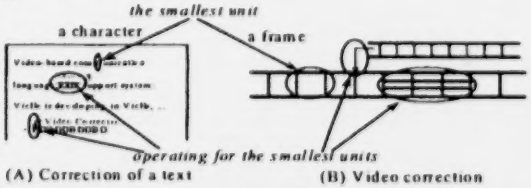

Figure 1 : Comparison between correction of a text and video correction.

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Online video-editing model

Several editing systems aid teachers when reviewing and correcting learners' drafts. Farkas & Poltrock (1995) classified an online text-editing model that considered four models; the silent editing model, the comment model, the edit trace model, and the traditional markup model. In the silent editing model, the teacher overwrites and corrects the learner's document. In the comment model, annotations are inserted in the original document. In the edit trace model, the teacher works in the manner of an author, deleting, adding, and moving text. The computer can compare an editor's new version with an original one. It allows learner to view the draft that contains teacher's changes. Microsoft Word accepts this model. The traditional markup model employs correction marks to the computer screen, for example, deletion, insertion, and move. According to this classification, this paper proposes an online video-editing model as follows: (See [Figure 2])

(A) *The silent model:* After correcting the wrong parts of an original video with a general video-editing tool, the teacher creates a new video file. This is the simplest model, however, it is very difficult for the learner to check the teacher's work. This model is destructive because the teacher cannot readily recover the original video once he/she has made a revised video.

(B) *The comment model:* This model employs pop-up notes, temporary footnotes, hidden text, and special symbols placed within the original video. A system based on this model is developed with SMIL. It often takes a considerable amount of time for teachers and learners to obtain a revised video from comments on the original video.

(C) *The Mark-up model:* This adapts the traditional marks used with pen and paper to video editing on the computer screen. The symbols are both familiar and intuitive for teachers and learners: for example, deletion, insertion, and move. For instance, MATE (Hardock et al, 1993) that is a text-based collaborative writing tool, allows teacher to use both digital ink and voice commands toward pen and voice computing. In this model, both learners and teachers can interpret the teacher's modification with markings much more readily than in the other models. Moreover, they can easily derive both the original video and the revised one from a marked-up video.

Many systems employ a traditional mark-up that allows multiple users to mark-up an electronic document as if they were marking up a printed copy of the document. However, no studies have ever tried to adapt a markup model into a video-editing system. Therefore, this paper proposes a video mark-up model for supporting language learning. In addition, a correcting system has also been developed.

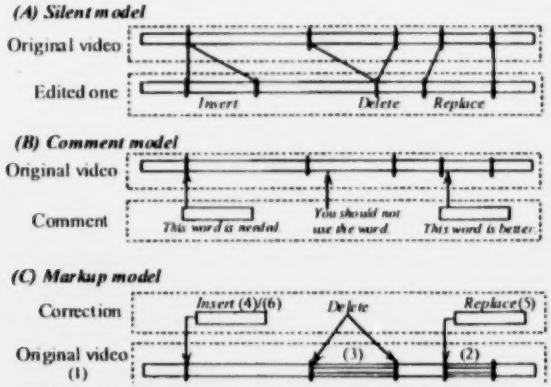

Figure 2 : Taxonomy of online video editing models.

Learning process using Vielle

In order to learn a video through video correction, the video to be revised by a teacher is needed. Then, the teacher can correct it and the learner can study with it. The learning flow shown as [Figure 3] is as follows.

(1) *Recording with a videoconference system:* A teacher gives lessons in speaking a language. The videoconference system in Vielle records a video of both the teacher and the learner. The learner and the teacher share the files via network. The video is used as a basal video for later operations.

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(2) *Correcting video:* The teacher corrects the recorded video with Vielle Editor. The instructor makes the data for correction and rectifies the video with it. The teacher sends the VCML file (made by Vielle-Editor) to the learner after correcting. The VCML file shows only the contents of the correction but the video is shared in (1) so the teacher does not need to resend the original video.

(3) *Learning by correction:* The learner studies using the corrected video with Vielle-Viewer. According to the VCML file and the learner's process, Vielle-Viewer plays the contents. When learning, the student reviews and repeats places that are different to understand on the corrected video.

(4) *Entering questions:* If the learner has some problems and questions, s/he can describe them. In addition, if there is a question from the teacher, s/he can answer it. After that, the Vielle-Viewer generates a VCML file and sends it to the teacher. The VCML file contains the learner's question and feedback. The data relates the correction to the original VCML with a link.

(5) *Grasping learner's feedback:* The teacher grasps the learner's feedback from the VCML file with the Vielle-Editor and refers to that work for the next time. The Vielle-Editor shows the feedback for each correction.

The above is repeated when learning. The learner and the teacher repeat the learning process and solve the learner's problem. As a result, the learner may improve his/her communicative skill.

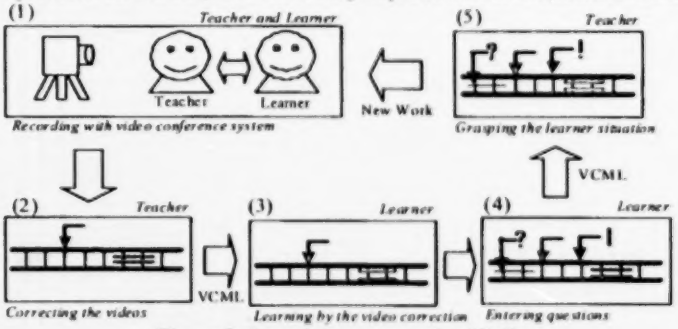

Figure 3: Learning process using Vielle.

VCML: Markup Language for Video Correction

Video-based Correction Markup Language (VCML) is proposed to describe video correction. In addition, it can represent the learner's condition after studying. This markup language is based on XML. XML is a markup language used to exchange the corrected contents on network. Therefore, a teacher and a learner can exchange the correction only with VCML because the original video is linked by VCML. Some of the advantages of VCML are as follows:

(1) It does not edit the original video.
(2) It uses the correction marks shown as [Table 1].
(3) It becomes a revised video by applying the tags of revised corrections.
(4) It becomes the explained video by applying the tags of explained corrections.
(5) It is possible to represent the condition of the learner's studying.
(6) It is independent of the kinds of computer and software.
(7) It is possible to send and receive by e-mail because of the text format.

Correction	Icon	Contents
Insert		Inserting media for explanation
Overlap		Composing comments
Replace		Replacing with other media
Delete		Deleting part
Repeat		Repeating the part
Pause		Pausing the point
Annotation		Inserting media as comment

Table 1: VCML tags for video correction.

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Implementation

Vicllc has been developed on Windows 2000. The development language is Java SDK1.3.1. Java Media Framework (JMF) 2.1.1a is used as a framework to deal with media, JAXP (Java API for XML Parsing) is used as a XML Parser, RELAX (Regular Language description for XML) to analyze XML documents, and Relaxer as a parser of RELAX are also used.

A snapshot of Vicllc-Editor and its pop-up windows is shown in [Figure 4]. In the (A)Correction Editor, a teacher can edit the original video with correction marks. The videos for the correction and the operation buttons are shown on it. When the teacher wants to correct the original video, s/he can rectify by choosing the correction mark on the (D)Correction Palette. The correction mark is inserted by clicking the palette. An example that inserts replace correction is shown. When the replace button is clicked, the (E)Correction Dialog appears. Then, the user selects the media type; text, audio, video, picture or link. In this case, the user selects video as the media and inputs the text to the comment box. After that, the correction of replace is completed. Similarly, the user can insert other corrections. In order to confirm or select the correction frame, the frames of the original video are shown in the (B)Timeline. The display method can be altered by the (C)Timeline Controller. In order to affirm the correction condition, the (F)Correction Status Bar is used. The inserted corrections are shown by the marks on the bar. In order to change the contents for playback, the (G)Play Mode is used. According to the attribute of correction marks, the playback contents can be changed.

Conclusions

This paper proposed an online video-based correction model for language learning. No studies have ever tried to adapt a markup model into a video-editing system. The prototype called Vicllc can correct videos recorded by the videoconference system. In addition, VCML is proposed to exchange corrected contents and learner's condition. A video was used as a tool for commentating or giving lessons. However, as the video correction uses the markup model, it can discover information required by a learner in real time. Thus, a video through video correction can be used as teaching materials. Although Vicllc was used for language learning in this paper, the video correction is independent of the domain. For instance, it can use sports training for the form; acquire gestures in different cultures like that between Japanese and Americans. In future work, a VCML document will be used to retrieve video databases that are stored VCML documents. The data can be used as error databases. Another point under consideration is the examination of a speech recognition system to help the correction work and train learner's pronunciation or intonation.

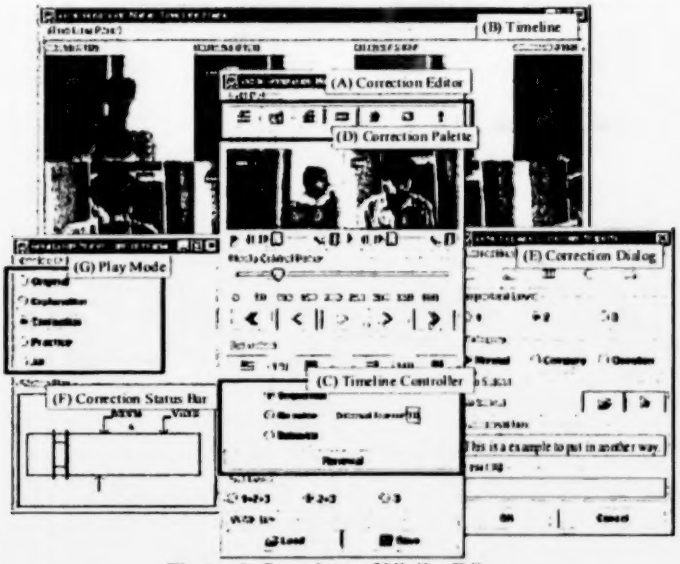

Figure 4: Snapshots of Vicllc-Editor.

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